

SPECIAL PROVISIONS

Contents:

- | | |
|--------------------------------------|--|
| 1. Scope of Work | 13. Material Sources |
| 2. Safety Standards | 14. Environmental Protection |
| 3. Project Meetings | 15. Weed Control |
| 4. Utilities and Barriers | 16. Permits and Regulatory Requirements |
| 5. Repair and Replacement Quality | 17. Smoke and Dust Control |
| 6. General Construction Requirements | 18. Use of Completed Portions |
| 7. Engineering Interpretations | 19. Warranty |
| 8. Rejected Work | 20. Contract Document Discrepancies |
| 9. Quality Control | 21. Site Cleanup |
| 10. Construction Surveys | 22. Sanitary Facilities |
| 11. Field Engineering | 23. Measurement and Payment |
| 12. Weather Days | 24. Construction Scheduling Requirements |

1. SCOPE OF WORK

This project includes the removal of existing asphalt, regrading and graveling of the base course and paving the entire parking lot at the interpretive/picnic area. Sidewalk removal and replacement will also be required to meet ADA standards.

The slurry seal of the entire parking lot is Additive Alternate #1.

2. SAFETY STANDARDS

The Contractor shall be solely and completely responsible for conditions of the jobsite, including safety of all persons (including employees) and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to U.S. Department of Labor (OSHA), and all other applicable Federal, State, County, and Local laws, ordinances, codes and regulations. Where any of these are in conflict, the more stringent requirement shall be followed. The Contractor's failure to thoroughly familiarize himself with the aforementioned safety provisions shall not relieve him from compliance with the obligations and penalties set forth therein.

The Contractor shall develop and maintain for the duration of this Contract a safety program that will effectively incorporate and implement all required safety provisions. The Contractor shall appoint an employee who is qualified and authorized to supervise and enforce compliance with the safety program.

The duty of the Engineer to conduct construction review of the work does not include review or approval of the adequacy of the Contractor's safety program, safety supervisor, or any safety measures taken in, on or near the construction site.

The Contractor, as a part of his safety program, shall maintain at his office or other well-known place at the jobsites, safety equipment applicable to the work as prescribed by the aforementioned authorities, all articles necessary for giving first-aid to the injured, and shall establish the procedure for the immediate removal to a hospital or a doctor's care of persons (including employees) who may be injured on the jobsite.

If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Engineer and the Owner. In addition, the Contractor must promptly report in writing to the Engineer all accidents whatsoever arising out of, or in connection with, the performance of the work whether on, or adjacent to, the site, giving full detail and statements of witnesses.

If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Engineer, giving full details of the claim.

The Contractor shall take all necessary provisions for safe handling of chemical amendments and potentially hazardous wastes, including apprising himself of hazards, developing safety plans, providing emergency and decontamination services, and developing spill containment procedures.

3. PROJECT MEETINGS

Pre-Construction Conference. After the Contract has been awarded, but before the start of construction, a pre-construction conference will be held at a time and place mutually agreed to by the parties. The conference shall be attended by the following: the Contractor and his superintendent; the principal subcontractors; representatives of principal suppliers and manufacturers, as appropriate; the Engineers and his construction observer; representatives of the Owner and others as appropriate.

Unless previously submitted, the Contractor shall bring the following submittals to the conference: list of proposed Subcontractors; proposed construction schedule; schedule for submitting shop drawings and other submittals; schedule procurement dates; construction technique submittal forms (as applicable); preliminary payment schedule; and tentative schedule of values. Work shall not start prior to the Engineer's receipt of these submittals. The Engineer will preside at the conference and will arrange for keeping the minutes and distributing copies of the minutes to all persons attending the meeting.

4. UTILITIES AND BARRIERS

Notification. The Contractor shall contact the one call locate number in advance of performing any excavation work on the site to obtain utility locates over the entire area to be impacted by construction of the project. The Contractor shall immediately notify the Engineer of the discovery of any utilities that are in conflict with the work that were not previously identified in the plans.

Identification. All utilities that may conflict with the work shall be the Contractor's responsibility to locate before any excavation is performed. Field markings provided by the utilities shall be preserved by the Contractor until actual excavation commences. All utility locations on the Drawings should be considered approximate and should be verified in the field by the Contractor. The Contractor shall also be responsible for locating all utilities that are not located on the Drawings.

Temporary Utilities. The Contractor shall provide all temporary electrical, lighting, telephone, heating, cooling, ventilating, water, sanitary, first aid, fire protection, and other utilities and services necessary for the performance of the work. All fees, charges, and other costs associated therewith shall be paid for by the Contractor.

Conflicts with Existing Utilities. For any utilities shown on the plans which are damaged or require temporary support to allow performance of the work, the Contractor shall contact the utility's owner and make all arrangements and pay all costs associated with the repair and/or temporary support of the utility. The Contractor shall comply with all requirements of the utility's owner.

The Contractor is responsible for the repair of any utilities that were properly marked by the utility locator and damaged by the Contractor, whether they are shown on the plans or not.

Barriers. The Contractor shall temporarily remove all fences, barricades, minor structures, and other obstructions that interfere with the prosecution of the work. Removal shall not extend beyond designated construction limits or right-of-way without first obtaining written authorization from the owner of the barrier.

Fences and barricades used for the confinement or exclusion of livestock, animals, or persons shall be replaced at the end of each work day to the extent necessary to perform the restrictive intent of the barrier.

Unless otherwise directed by the Engineer or indicated on the Drawings, all barriers so removed shall be replaced following the completion of the work to as good or better condition than existed prior to the start of work. The requirement applies to small trees and decorative shrubs as well as fences, barricades, and minor structures.

The Contractor shall replace at his own expense all barriers damaged or destroyed.

5. REPAIR AND REPLACEMENT QUALITY

General. Items requiring repair or replacement due to damage or removal or otherwise necessitated in the course of pursuance of the work and which are not otherwise specified herein, shall be repaired or replaced to the following levels of quality.

Paved and Gravel Roads, Driveways, and Sidewalks. Repair or replacement shall be to a thickness and grade matching the existing condition. Quality of materials and methods shall comply with respective sections of the current edition of the Montana Public Works Standard Specifications.

Water and Sewer Main and Services. Repair or replacement shall be in a manner consistent with the existing condition using materials conforming to the Uniform Plumbing Code, the current editions of the DEQ 1 and DEQ 2 circulars, American Water Works Association Standard Specifications, and the requirements of the Montana Department of Environmental Quality. Construction shall also comply with the current edition of the Montana Public Works Standard Specifications. Repair or replacement will not be allowed with materials like the existing installation if they do not conform to the above-referenced standards.

Electrical, Telephone, Cable TV, Natural Gas, and Petroleum Lines. Repair or replacement shall be to the standards required by the utility owner and at the utility owner's option may be performed by the utility owner with full cost assessed to the Contractor.

Fences. All fences adjacent to any work site are to be maintained to the satisfaction of the abutting property owners. The Contractor shall notify the landowners of the need to temporarily removed or relocate fences for access to the work and shall coordinate such activities with the respective landowners in regards to removal, relocation, and restoration of fences prior to commencing work.

Any fence removed or destroyed during the course of the Contract shall be reinstalled or reconstructed in like kind at no cost to the Owner or the landowner. The cost for this work shall be considered incidental and no additional compensation will be allowed.

Other Items. Repair or replacement of other items not covered by the preceding shall be to the standards required by the owner of the item and at the owner's option may be performed by the owner of the item with full cost assessed to the Contractor.

Decisions Regarding Repair Versus Replacement. The decision of repair versus replacement of an affected item shall be at the discretion of the Engineer upon consultation with the owner of the item. The decision shall be based on a determination of whether repaired quality can equal the quality of a replacement installation. The Engineer's authority shall be final in this regard.

Limits of Repair and Replacement. The limits of areas to be repaired or replaced shall be determined by the Engineer in the field based on the extent of damage or removal sustained. The determination shall be based on insuring that all damaged or removed portions of the existing installation are fully restored. The authority of the Engineer shall be final in this regard. All work effects outside limits as described in these Contract Documents are subject to repair and replacement quality as described herein.

Repair by Party Owning or Maintaining Item. The party owning or maintaining the item under consideration shall have the exclusive right to undertake repair or replacement themselves and charge the Contractor for full costs incurred or to direct and supervise the Contractor to repair or replace the item to their standard of quality. The authority of the owner of the item shall be final in this regard.

6. GENERAL CONSTRUCTION REQUIREMENTS

Quality Assurance. The Engineer will monitor the construction of work covered by this section to determine if the work is being performed in accordance with the contract requirements. The Engineer does not have the authority or the means to control the Contractor's methods of construction. It is, therefore, the Contractor's responsibility to utilize all methods, equipment, manpower, and other means necessary to assure that the work is installed in compliance with the Drawings and Specifications, and laws and regulations applicable to the work. All buried work items shall be installed in the presence of the Engineer or may not be considered for payment.

Grade and Alignment. The Contractor shall provide all construction staking as required to define the locations of the roadway, latrine, sidewalk and other features to be installed under this contract.

Tolerances. Construction tolerances for the work shall be as outlined in the Technical Specifications.

Construction Limits. The limit shall be limited to 10 feet from any edge of excavation and embankment, or any other improvements shown on the plans. Otherwise all equipment access is allowed within the existing parking lot. Disturbance and equipment access beyond this limit is not allowed without the written approval of both the Engineer and the owner of the affected property. If so approved, disturbance beyond construction limits shall meet all requirements imposed by the landowner; this includes existing roads used and/or improved as well as the construction of new access roads. Special construction, reclamation, or post-construction road ripping or other closure provisions required by the landowner on access roads beyond the construction limits shall be performed by the Contractor at no additional cost to the Owner.

Areas of Disturbance. Approved areas of disturbance are those areas disturbed by construction activities within the construction limits and along designated or approved access routes. Such areas shall be fine graded to blend with the existing terrain. Other areas that are disturbed by the Contractor's activities outside the limits noted above will be considered as site damage or unapproved areas of disturbance subject to the repair and replacement quality as specified herein. Such areas will also require the reclamation operations noted above and as specified herein, but costs of such work shall be borne by the Contractor. This includes areas selected by the Contractor outside the defined construction limits for mobilization, offices, equipment, or material storage. Stockpiling of gravel on-site is not allowed except within the parking lot.

7. ENGINEERING INTERPRETATIONS

Engineering Decisions. It is realized that timely engineering decisions on construction activities or results have an important bearing on the Contractor's schedule. On this project, the Engineer will make every effort to have a Project Inspector readily available to the project during the construction schedule, who has the authority to make judgement calls on matters dealing with interpretation of the plans and specifications, with one qualification: that he shall have the right to take twenty-four (24) hours to confer with other Engineers before giving said decision.

When the decision affects a plan design or specification change, it should be realized that more time may be required than twenty-four (24) hours to gain the necessary Owner and funding source participation in the decision process including time for formal change order preparation as required.

8. REJECTED WORK

Any defective work or nonconforming materials or equipment that may be discovered at any time prior to the expiration on the warranty periods shall be removed and replaced by work which shall conform to the provisions of the Contract Documents. Any material condemned or rejected shall be removed at once from the project site. Failure on the part of the Engineer to condemn or reject bad or inferior work or to note nonconforming materials or equipment on Contractor's submittals shall not be construed to imply acceptance of such work. The Owner shall reserve and retain all its rights and remedies at law against Contractor and its Surety for correction of any and all latent defects discovered after the guarantee period.

The Engineer will have the authority to reject work that does not conform to the Contract Documents and will provide the Owner with a list of defective work and nonconforming materials of equipment. The Owner will then promptly provide the Contractor with the list of defective work and nonconforming materials or equipment.

9. QUALITY CONTROL

Scope. All work will be tested and inspected to insure compliance with the Contract Documents. Complete payment will not be made until the Contractor has demonstrated that the work is complete and will perform as required.

Performance of Tests and Inspections. The Contractor, Owner, Engineer, and representatives of funding and regulatory agencies will perform periodic inspections and tests to determine compliance with the Contract Documents. The Contractor shall provide qualified manufacturer's representation during tests of equipment and special procedures as required by the Contract Documents.

Notification. The Contractor shall provide the Engineer with a written schedule indicating dates for specific testing and inspection services to be performed. The schedule shall be updated as required to give the Engineer at least a week's advance notice. The Contractor shall notify the Engineer immediately of any change or shall be subject to pay engineering fees as herein described.

Inspection. The Contractor shall inspect the work as it is being performed. Any deviation from the requirements shall be immediately corrected. Prior to any scheduled inspection by the Engineer, the Contractor shall again inspect the work and certify to the Engineer that he has inspected the work and it meets the requirements of the Contract Documents.

The Engineer's representative will observe work and compare the quality of the work with the requirements of the Contract Documents. Any discrepancies noted shall be brought to the Contractor's attention, who shall immediately correct the discrepancy. Failure of the Engineer to detect a discrepancy will not relieve the Contractor of his ultimate responsibility to perform the work as required.

Should the Engineer incur additional costs to make additional observation as a result of unacceptable work, the Contractor shall reimburse the Owner for additional engineering fees at the Engineer's rates at the time.

Observation by the Engineer's representative shall not be considered as authorization to proceed with the work. Work progress and the performance of quality work are the Contractor's responsibility. The Engineer's observation is for the purpose of determining what work will be paid for and what work will not be paid for. If the Engineer detects a discrepancy between the work and the requirement of the Contract Documents at any time, up to and including final inspection, such work will not be completely paid for until the Contractor has corrected the deficiency.

The work will be subject to review by the Owner and funding agency representatives whose findings shall be as valid as those of the Engineer. The results of all such observations shall be directed to the Contractor through the Engineer.

Equipment and System Tests. The Contractor shall provide all equipment, materials, supplies, manufacturer's representation, and incidentals necessary to perform tests on completed work. The Contractor shall notify the Engineer, in advance, when, where, and on what portion of the work a test will be performed and shall perform the test in the presence of the Engineer. The Engineer's presence during the test will not relieve the Contractor of his responsibility to provide equipment and systems meeting all the requirements of the Contract Documents and to warrant the work as required.

Should any tests performed in the presence of the Engineer fail to meet the requirements of the Contract Documents or should the Contractor fail to provide adequate notice of a change in scheduling tests, the Contractor shall reimburse the Owner for additional engineering fees resulting there from.

10. CONSTRUCTION SURVEYS

Construction surveying shall be provided by the Contractor.

11. FIELD ENGINEERING

Engineering Services Provided by the Owner. The Owner shall provide the following engineering services at no cost to the Contractor except as required for certain tests and retests as defined in the Contract Documents.

Review of submittals and shop drawings as defined in the Specifications.

Periodic inspections by the Engineer and its representative(s) as deemed appropriate by the Owner and Engineer.

Independent Services Provided by the Contractor. The Contractor shall provide the following services at no additional cost to the Owner.

Field Density Testing of materials as required per the Technical Specifications. Testing shall be provided by a certified independent testing laboratory. Testing frequencies shall be as follows:

Crushed Base Course – 1 test per 500 sy of Crushed Base Course
Asphalt Surfacing – 1 test per 500 sy of Crushed Top Surface

Concrete testing as required by the Technical Specifications.

Preparation and certification of all required shop drawings and submittals.

Performance of certain tests as required by the Contract Documents.

Maintenance of project drawings, accurately marked up with changes.

Design of all temporary construction falsework, bracing, shoring, support, or other structural work necessary for the permanence of the work.

Engineering Services Paid for by the Contractor. The Contractor is advised that certain engineering services required by the Contract Documents will be performed by the Engineer and paid for by the Contractor.

In general, these services include retests by the Engineer of tests that have failed, repeated review of submittals and shop drawings that have not been approved, and other services that are within the Contractor's control to avoid.

Payment of engineering services shall be made by invoice to the Contractor or deducted from partial payments, whichever is necessary.

12. WEATHER DAYS

Weather Days. In the event inclement weather or the aftermath of inclement weather prevents the Contractor from performing the sequence of operations that should be in progress at that time for a minimum of 60% of the normal daily schedule being worked, he may request a time credit for that day. No credit for inclement weather will be allowed on non-working days (Saturday, Sunday, and Holidays).

Determination of the number of credit days will be made between the Contractor and the Engineer at the end of each calendar month.

13. MATERIAL SOURCES

If additional material is needed for embankment or other materials, the Contractor will be responsible for placement and import from an off-site site location secured by the Contractor.

If excess material is generated during construction, the Contractor shall be responsible for export and disposal at an off-site location secured by the Contractor.

Haul routes shall be within the corridors of disturbance created by this project.

14. ENVIRONMENTAL PROTECTION

The Contractor shall comply with all laws and regulations of the United States Corps of Engineers and Environmental Protection Agency, Montana Department of Fish, Wildlife and Parks, Department of State Lands, Department of Environmental Quality, the Department of Natural Resources and Conservation, and with all other Federal, State, and Local laws and regulations controlling pollution of the environment. He shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

The Contractor also agrees to comply with the requirements of any permits obtained for the project by the Owner. These permits include but may not be limited to the permits listed under the Permits and Regulatory Requirements section. Copies of any of these permits are available upon request from the Engineer.

The Contractor shall be responsible for submitting and obtaining a temporary discharge permit from the Montana Department of Environmental Quality for the discharge of any water related to the construction of this project. A construction Dewatering Discharge Permit, issued by the Department of Environmental Quality, is required if water from construction is discharged to state waters. The Department of Environmental Quality must be contacted immediately if either contaminated soil or contaminated groundwater is encountered.

The Contractor shall be responsible for submitting and obtaining a storm water discharge permit from the Montana Department of Environment Quality. The cost of any erosion control measures or other work required by the permit shall be included in the bid and are considered incidental to the project.

15. WEED CONTROL

Prior to mobilizing equipment to the project site, the Contractor shall clean his equipment and vehicles to assure no weeds are imported. If there is an abnormal growth of noxious weeds on a project site after construction as determined by the Owner or local weed control authority, the Contractor may be responsible for weed control under the contract warranty.

16. PERMITS AND REGULATORY REQUIREMENTS

Jurisdiction. The performance of this work shall be under the jurisdiction of the following agencies, departments, and standards and compliance with the requirements thereof is required:

Federal Level: United States Law

State Level: Department of Environmental Quality; Department of Fish, Wildlife & Parks; Montana Department of Transportation; Montana Building Code Division; Uniform Building Code; Uniform Plumbing Code; Uniform Mechanical Code; National Electric Code; State annotations to these codes; and Montana State Law.

Local Level: Gallatin County

Contractor's Responsibility. The Contractor shall familiarize himself with the requirements of all regulatory agencies pertaining to the performance of the work on the project.

The Contractor shall secure and pay for all permits, licenses, and fees necessary for the performance of the work.

The Contractor shall perform all work in accordance with the regulatory requirements. Any conflict between the Contract Documents and the regulatory requirements shall be brought to the immediate attention of the Engineer.

The following permits will be required for construction:

Permit	Entity Providing Permit	Entity Submitting Permit
SWPPP Floodplain Permit	MDEQ Gallatin County	Contractor FWP

17. SMOKE AND DUST CONTROL

The Contractor shall have informed himself of all applicable State Board of Health requirements and similar State or Federal requirements pertaining to control of or abatement of air pollution.

The Contractor shall have provided or be prepared to provide such air pollution control measures as are required to comply with the minimum standards established by such agencies.

Hauling of material and transport of equipment along public roadways or through the towns and adjacent other structures and dwellings shall require effective dust abatement procedures. This also applies to the unloading and placement of spoils material at deposition sites. The Contractor shall utilize environmentally sound methods for watering and/or otherwise chemically treating dust-generating surfaces to comply with all applicable legal standards for airborne particulates. Prior to any work, the Contractor shall submit a written plan for dust abatement procedures identifying at a minimum the following:

- Times and nature of dust generating activity on public roads and at deposition sites.
- Nature and chemical characterization of dust abatement materials to be used.
- Method of application of dust abatement materials to be used.
- Time schedule for application of dust abatement materials to be used.
- Availability of equipment and operators for emergency application of dust abatement materials at other than scheduled times.

Watering for dust control is considered incidental to the Contract and shall be performed at no additional cost to the Owner.

18. USE OF COMPLETED PORTIONS

The Owner shall have the right to take possession of and use any completed or partially completed portions of the work, notwithstanding that the time for completing the entire work or such portions may not have expired; but such taking possession and use shall not be deemed an acceptance of any work not completed. If such taking possession and use of incomplete work causes refinishing of completed work, the Contractor shall be entitled to such extra compensation or extension of time or both, as agreed by the Owner.

19. WARRANTY

The Contractor shall warranty all materials and equipment furnished and work performed for a period of one year from the date of final city acceptance. The Contractor warrants and guarantees for a period of one year from the date of final acceptance of the project that the project is free of all defects due to faulty material or workmanship and the Contractor shall promptly make such corrections as necessary by reason of such defects including repair or damage to other parts of the project resulting from such defects. The Owner will give notice of observed defects with reasonable promptness. In the event the Contractor should fail to make such repairs, adjustments, or other work that may be made necessary by such defects, the Owner may repair the defects and charge the Contractor the cost thereby incurred. The performance bond shall remain in full force for a period of one year after final city acceptance.

20. CONTRACT DOCUMENT DISCREPANCIES

In the event that a provision of the Contract Documents conflicts with any other provision the Contract Documents, the provision in that Contract Document first listed below shall govern, except as otherwise specifically stated:

- Agreement
- Addenda to Contract Documents
- Performance and Labor and Materials Bond
- Proposal (bid)
- Bid Security
- Bid Provisions
- Invitation to Bid
- Instructions to Bidders
- Drawings
- Special Provisions
- Technical Specifications
- Supplementary Conditions
- General Conditions

21. SITE CLEANUP

The Contractor shall be responsible for final clean up at the end of the project to a level satisfactory to the Owner. All construction debris, no matter how small, shall be collected and removed from the site. All wheel ruts shall be filled in and be leveled to match the adjacent grade and material. Re-seeding or re-sodding, or other re-surfacing may be necessary to repair any construction related impacts or damage.

All survey markings, stakes, temporary paint marks, flagging and other devices shall be removed regardless of who installed them. All excess pavement, concrete, gravel, soil, or other construction materials not intended for permanent use shall be removed.

All final slopes shall be dressed manually to remove woody debris, accumulated trash and oversized material. Any new slope or topsoil surfaces shall be hand raked to provide a uniform appearance. The Contractor shall dress all gravel, pavement and concrete edges to eliminate abrupt edges and provide a smooth transition. All construction related temporary sediment control devices shall be removed as soon as practical.

Unless specifically noted otherwise, all final cleanup work shall be incidental to other work items in the contract and no separate payment shall be made.

22. SANITARY FACILITIES

Sanitary facilities shall be provided and maintained by the Contractor who will comply with state and local regulations. The cost of furnishing, installing, and maintaining sanitary facilities shall be considered incidental to other items of work and no additional compensation will be allowed.

23. MEASUREMENT AND PAYMENT

- A. **Scope:** This section describes the method of measurements and the basis of payment for all work shown on the drawings and required by the Contract Documents. This measurement and payment section shall take precedence over all other references to measurement and payment referenced in these specifications (with the exception of any addenda).
- B. **Bid Prices:** The bid price for each item of the Contract in the Bid Proposal shall cover all work shown on the drawings and be defined in the specifications and other contract documents. All costs in connection with the work including furnishing all materials, equipment, and tools, and performing all necessary labor and supervision to fully complete the work, shall be included in the lump sum or unit price bid items on the proposal. The amounts shown on the proposal shall be the contract price.

No item that is required by the Contract Documents for the proper and successful completion of the work will be paid for outside of or in addition to the prices submitted in the Bid Proposal. All work not specifically set forth as a pay item in the Bid Proposal shall be considered a subsidiary obligation of the Contractor and all cost in connection therewith shall be included in the prices bid.

Retainage at the amounts specified in the General Conditions will be withheld from each progress payment.

- C. **Estimated Quantities:** Any estimated quantities stipulated in the Bid Proposal or other Contract Documents are approximate and are to be used only as a basis for estimating probable cost of the work and for the purpose of comparing the bids submitted for the work.
- D. **Method of Measurement:** No measurement will be made on bid items representing a lump sum bid.

E. **Basis of Payment:**

1. **Mobilization, Insurance & Bonding**

- ♦ General: This bid item shall include the costs associated with mobilizing to the project site, insurance, permitting, and submittals.
- ♦ Work Included:
 - All labor, tools, equipment, materials, royalties, and incidentals needed to complete the work as specified;
 - Transport and set up all equipment, materials, and other items needed to complete the project;
 - All permits, coordination, and compliance inspections required for the work;
 - Insurance;
 - Provide and install project sign;
 - Prepare and provide submittals, construction schedule, and all other paperwork required by the contract documents prior to construction startup.
- ♦ Measurement: Measurement shall be one lump sum bid item.
- ♦ Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

2. **Remove Existing Asphalt**

- ♦ General: This bid item shall include the removal of existing asphalt.
- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Remove existing asphalt;
 - Saw cut existing asphalt;
 - Remove existing asphalt from site;
 - Survey as needed;
 - Watering and dust control.
- ♦ Measurement: Measurement shall be per square yard of asphalt removed. Measurement shall be rounded to the nearest square yard.
- ♦ Payment: Payment shall be by the unit price bid listed in the proposal for each square yard of asphalt removed.

3. Remove Existing Sidewalk

- ♦ General: This bid item shall the removal of existing sidewalk and ADA ramps.
- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Remove existing sidewalk and ADA ramps;
 - Saw cut existing concrete;
 - Remove existing concrete from site;
 - Survey as needed;
 - Watering and dust control.
- ♦ Measurement: Measurement shall be per square foot of sidewalk removed. Measurement shall be rounded to the nearest square foot.
- ♦ Payment: Payment shall be by the unit price bid for each square foot of sidewalk removed listed in the proposal.

4. New Asphalt Surfacing over Existing Base Course

- ♦ General: This bid item shall include the placement and grading of gravel section over existing base course and the placement of asphalt surfacing.
- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Grading and compaction to prepare existing base course surfacing;
 - Import, place, grade and compact crushed base course as needed to meet design elevations;
 - Compaction testing;
 - Survey;
 - Provide and place asphalt surfacing.
- ♦ Measurement: Measurement shall be per square yard of new asphalt surfacing installed. Measurement shall be rounded to the nearest square yard.
- ♦ Payment: Payment shall be by the unit price bid listed in the proposal for each square yard of new asphalt surfacing placed.

5. New Full Depth Asphalt Section

- ♦ General: This bid item shall include the placement of crushed base course and asphalt surfacing.
- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Excavation, embankment and subgrade preparation;
 - Import, place, grade and compact crushed base course;
 - Compaction testing;
 - Survey;
 - Provide and place asphalt surfacing.
- ♦ Measurement: Measurement shall be per square yard of new full depth asphalt section installed. Measurement shall be rounded to the nearest square yard.
- ♦ Payment: Payment shall be by the unit price bid listed in the proposal for each square yard of new full depth asphalt section placed.

6. Bluetop Staking

- ♦ General: This bid item shall include setting bluetop stakes to define the grade for the crushed base course surface.
- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Provide and set bluetop stakes.
- ♦ Measurement: Measurement shall be one lump sum bid item.
- ♦ Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

7. New Sidewalk

- ♦ General: This bid item shall include the installation of sidewalk and ADA ramps.

- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Subgrade preparation;
 - Provide and place gravel base;
 - Formwork and reinforcement;
 - Tactile panels;
 - Provide and place concrete for sidewalks and ADA ramps;
 - Survey.
- ♦ Measurement: Measurement shall be per square foot of sidewalk installed. Measurement shall be rounded to the nearest square foot.
- ♦ Payment: Payment shall be by the unit price bid for each square foot of sidewalk listed in the proposal.

8. Hand Railing

- ♦ General: This bid item shall include providing and installing hand railing.
- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Survey are required to locate hand railing;
 - Provide, fabricate and install hand railing;
 - Paint hand railing;
 - Install anchor bolts and base plates.
- ♦ Measurement: Measurement shall be one lump sum bid item.
- ♦ Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

8. Retaining Wall

- ♦ General: This bid item shall include providing precast concrete block retaining wall.
- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Survey are required to locate retaining wall;

- Provide and install precast concrete wall units;
 - Excavation and embankment;
 - Provide and place gravel base material;
 - Fine grading of disturbed area.
- ♦ Measurement: Measurement shall be one lump sum bid item.
 - ♦ Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

10. New Concrete Curb Stop

- ♦ General: This bid item shall include the placement of new concrete curb stops.
- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Provide and place curb stop;
 - Provide and install rebar and rebar end caps;
 - Any modifications to the curb stop necessary for installation;
 - Survey as necessary.
- ♦ Measurement: Measurement shall be per each new concrete curb stop installed.
- ♦ Payment: Payment shall be by the unit price bid for each new concrete curb stop installed listed in the proposal.

11. Handicapped Parking Sign

- ♦ General: This bid item shall include the installation of new Handicapped Parking signs.
- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Provide and install sign posts;
 - Survey as required to locate signs;
 - Provide and secure sign to posts;
 - Fine grading of disturbed area.
- ♦ Measurement: Measurement shall be per each handicapped sign installed.

- ♦ Payment: Payment shall be by the unit price bid for each handicapped sign installed listed in the proposal.

12. Remove and Reset Existing Landscaping Rock

- ♦ General: This bid item shall include removing and resetting existing landscaping rock.
- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Remove and reset rocks;
 - Excavation and embankment;
 - Surface repair;
 - Survey.
- ♦ Measurement: Measurement shall be per each rock relocated.
- ♦ Payment: Payment shall be by the unit price bid for each rock relocated listed in the proposal.

13. Remove and Reset Existing Sign

- ♦ General: This bid item shall include relocating existing sign.
- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Remove and install sign;
 - Survey as required locate;
 - Fine grading of disturbed area.
- ♦ Measurement: Measurement shall be per each sign relocated.
- ♦ Payment: Payment shall be by the unit price bid for sign relocated listed in the proposal.

14. Relocate Existing Sprinkler System

- ♦ General: This bid item shall include relocating a sprinkler system to a new location.

- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Remove and salvage existing sprinkler heads;
 - Survey as required;
 - Reset sprinkler heads;
 - Provide and install new irrigation pipe;
 - Trench excavation and backfill;
 - Fine grading of disturbed area.
- ♦ Measurement: Measurement shall be one lump sum bid item.
- ♦ Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

15. Import and Place Topsoil

- ♦ General: This bid item shall include importing and placing topsoil.
- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Provide and place topsoil.
 - Fine grading.
- ♦ Measurement: Measurement shall be one lump sum bid item.
- ♦ Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

16. Seed, Mulch and Fertilize

- ♦ General: This bid item shall include the seeding, mulching and fertilizing of disturbed areas.
- ♦ Work Included:
 - All labor, tools, equipment, materials, royalties, and incidentals needed to complete the work as specified;
 - Fine grading and conditioning of topsoil;
 - Provide and place seed, mulch and fertilizer;
 - Maintenance of seeded area as required by specifications.
- ♦ Measurement: Measurement shall be one lump sum bid item.

- ♦ Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

17. Striping

- ♦ General: This bid item shall include the installation of pavement markings including striping and ADA symbols.
- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Install pavement markings.
 - Survey.
- ♦ Measurement: Measurement shall be one lump sum bid item.
- ♦ Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

18. Type II Microslurry

- ♦ General: This bid item shall include sealing paved surfaces with type II microslurry.
- ♦ Work Included:
 - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
 - Provide and place type II microslurry.
- ♦ Measurement: Measurement shall be per square yard of type II microslurry installed. Measurement shall be rounded to the nearest square yard.
- ♦ Payment: Payment shall be by the unit price bid listed in the proposal for each square yard of type II microslurry installed.

25. CONSTRUCTION SCHEDULING REQUIREMENTS

Construction of the project shall begin no earlier than July 29, 2013. The project shall be substantially complete by August 28, 2013. Substantial completion shall be defined as the project

being ready to serve its intended use. All concrete and asphalt shall be placed, the parking lot shall be striped, signs installed, topsoil placed, and seeding completed. The parking lot will be reopened for public use no later than the August 28th, 2013. The project completion date will be delayed to account for any weather days that are granted.

TECHNICAL SPECIFICATIONS
TABLE OF CONTENTS

SECTION 1 – GENERAL

01/750 Final Cleanup.....1

SECTION 2 - SITEWORK

02/512 Type II Emulsified Asphalt Slurry Seal 1-8

SECTION 5 -METALWORK

05/520 Handrails and Railings..... 1-4

Note:
All other work shall be performed in compliance with the Montana Public Works Specification- Sixth Edition. The Montana Public Works Specifications shall be modified to require the Contractor to provide compaction testing through an independent testing laboratory, not the Owner.

SECTION 01750
FINAL CLEANUP

PART 1 GENERAL

1. DESCRIPTION

- A. This work consists of final cleanup of the project site prior to final acceptance.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

1. CONTRACTOR RESPONSIBILITIES

The contractor shall be responsible for final clean up at the end of the project to a level satisfactory to the owner. All construction debris, no matter how small, shall be collected and removed from the site. All wheel ruts shall be filled in and be leveled to match the adjacent grade and material. Re-seeding or re-sodding, or other re-surfacing may be necessary to repair any construction related impacts or damage.

All survey markings, stakes, temporary paint marks, flagging and other devices shall be removed regardless of who installed them. All excess pavement, concrete, gravel, soil, or other construction materials not intended for permanent use shall be removed.

All final slopes shall be dressed manually to remove woody debris, accumulated trash and oversized material. Any new slope or topsoil surfaces shall be hand raked to provide a uniform appearance. The contractor shall dress all gravel, pavement and concrete edges to eliminate abrupt edges and provide a smooth transition. All construction related temporary sediment control devices shall be removed as soon as practical.

PART 4 MEASUREMENT AND PAYMENT

1. PAYMENT

Unless specifically noted otherwise, all final cleanup work shall be incidental to other work items in the contract and no separate payment shall be made.

END OF SECTION 01750

SECTION 02513

TYPE II EMULSIFIED ASPHALT SLURRY SEAL

PART 1 GENERAL

1. DESCRIPTION

- A. Emulsified Asphalt Slurry Seal shall consist of a mixture of polymer-modified emulsified asphalt, mineral aggregate, water, and additives, proportioned, mixed and uniformly spread over a properly prepared surface. The slurry seal shall be applied as a homogeneous mat, adhere firmly to the prepared surface, and have a skid-resistant texture throughout its service life.

2. SUBMITTALS

- A. The **CONTRACTOR** shall provide the following information:
 - 1. Mix design.
 - 2. Aggregate sieve analysis.
 - 3. Information on mineral filler and additives.
 - 4. Description of placement equipment.

PART 2 PRODUCTS

1. MATERIALS

A. Emulsified Asphalt

- 1. General – The emulsified asphalt shall be polymer modified. The polymer material shall be milled or blended into the asphalt or emulsifier solution prior to the emulsification process. Emulsifier shall be three percent (3%) polymer solids, based on asphalt weight, minimum.
- 2. Quality Tests – The emulsified asphalt, and emulsified asphalt residue, shall meet the requirements of AASHTO M 208 or ASTM D 2397 for CQS-1h, with the following exceptions:

TEST	TEST METHOD		SPECIFICATION
	AASHTO	ASTM	
Settlement and Storage Stability of Emulsified Asphalts, 24-h	T 59	D 6930	1% Maximum
Distillation of Emulsified Asphalt ¹	T 59	D 6997	62% Minimum
Tests of Emulsified Asphalt Residue			
Softening Point of Bitumen (Ring-and-Ball Apparatus)	T 53	D 36	135°F (57°C) Minimum
Penetration of Bituminous Materials at 77°F (25°C)	T 49	D 5	40-90 ²

¹The temperature for this test should be held at 350°F (177°C) for 20 minutes.

²The climatic conditions should be considered when establishing this range.

Each load of emulsified asphalt shall be accompanied with a Certificate of Analysis/Compliance to indicate that the emulsion meets specification.

B. Aggregate

1. General – The mineral aggregate used shall be the type specified for the particular application requirements of the slurry seal. The aggregate shall be a crushed stone such as granite, slag, limestone, chat, or other high-quality aggregate, or combination thereof. To assure the material is 100 percent crushed, the parent aggregate will be larger than the largest stone in the gradation used.
2. Quality Tests – The aggregate should meet these minimum requirements:

TEST	TEST METHOD		SPECIFICATION
	AASHTO	ASTM	
Sand Equivalent Value of Soils and Fine Aggregate	T 176	D 2419	45 Minimum
Soundness of Aggregates by Use of Sodium Sulfate of Magnesium Sulfate	T 104	C 88	15% Maximum w/Na ₂ SO ₄ 25% Maximum w/MgSO ₄
Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine ¹	T 96	C 131	35% Maximum

¹The abrasion test is run on the parent aggregate.

3. Gradation – The mix design aggregate gradation shall be:

SIEVE SIZE	TYPE II PERCENT PASSING
¾ (9.5 mm)	100
#4 (4.75 mm)	90-100
#8 (2.36 mm)	65-90
#16 (1.18 mm)	45-70
#30 (600 µm)	30-50
#50 (300 µm)	18-30
#100 (150 µm)	10-21
#200 (75 µm)	5-15

C. Mineral Filler

1. General – Mineral Filler may be used to improve mixture consistency and to adjust mixture breaking and curing properties. Portland cement, hydrated lime, limestone dust, fly ash, or other approved filler meeting the requirements of ASTM D 242 shall be used if required by the mix design. Typical use levels are normally 0.0 – 3.0 percent and may be considered part of the aggregate gradation.

D. Water

1. General – The water shall be free of harmful salts and contaminants. If the quality of the water is in question, it should be submitted to the laboratory with the other raw materials for the mix design

E. Additives

1. General – Additives may be used to accelerate or retard the break/set of the slurry seal. Appropriate additives, and their applicable use range, should be approved by the laboratory as part of the mix design.

2. LABORATORY EVALUATION

A. Mix Design

1. Compatibility of the aggregate, polymer-modified emulsified asphalt, water, mineral filler, and other additives shall be evaluated in the mix design. The mix design shall be completed using materials consistent with those supplied by the Contractor for the project. Tests and values are as follows:

TEST	ISSA TB NO.	SPECIFICATION
Mix Time @ 77°F (25°C)	TB 113	Controllable to 120 Seconds Minimum
<u>Slurry Seal Consistency</u>	TB 106	0.79-1.18 inches (2.0 - 3.0 cm)
Wet Cohesion @ 30 Minutes Minimum (Set) @ 60 Minutes Minimum (Traffic)	TB 139	12 kg-cm Minimum 20 kg-cm or Near Spin Minimum
Wet Stripping	TB 144	Pass (90% Minimum)
Wet-Track Abrasion Loss One-hour Soak	TB 100	50 g/ft ² (538 g/m ² Maximum)
Excess Asphalt by LWT Sand Adhesion	TB 109	50 g/ft ² (538 g/m ² Maximum)

2. The component materials shall be designed within the followings limits:

COMPONENT MATERIALS	SUGGESTED LIMITS
Residual Asphalt	5.5 - 10.5% by dry weight of aggregate
Mineral Filler	0.0 - 3.0% by dry weight of aggregate
Polymer Content	Minimum of 3.0% solids based on bitumen weight content
Additives	As needed
Water	As required to produce proper mix consistency

B. Mix Tolerances

1. Tolerances for the slurry seal mixture are as follows:
 - a. After the residual asphalt content is determined, a variation $\pm 1\%$ by weight of dry aggregate will be permitted.
 - b. The slurry consistency, as determined according to ASSA TB No. 106, shall not vary more than ± 0.2 -inches (± 0.5 cm) from the job formula after field adjustments.
 - c. The rate of application shall not vary more than ± 2 lb/yd² (± 1.1 kg/m²) when the surface texture does not vary significantly.

PART 3 EXECUTION

1. EQUIPMENT

A. General

1. All equipment, tools, and machines used in the application of slurry seal shall be maintained in satisfactory working condition at all times.

B. Mixing Equipment

1. The machine shall be specifically designed and manufactured to apply slurry seal. The material shall be mixed by an automatic-sequenced, self-propelled slurry seal mixing machine of either truck mounted or continuous run design. Continuous run machines are those that are equipped to self load materials while continuing to apply slurry seal. Either type of machine shall be able to accurately deliver and proportion the mix components through a mixer and discharge the mixed product on a continuous-flow basis. Sufficient storage capacity for all mix components is required to maintain an adequate supply to the proportioning controls.

C. Proportioning Devices

1. Individual volume or weight controls for proportioning mix components shall be provided and properly labeled. These proportioning devices are used in material calibration to determine the material output at any time.

D. Spreading Equipment

1. General - The mixture shall be placed uniformly by means of a spreader box attached to the paver and mechanically equipped, if necessary, to agitate and spread the material evenly throughout the box. With some quick-set systems, mechanical agitation may extend mix time. Spraying of additional water into the spreader box will not be permitted.

The front seal shall be provided to ensure no loss of the mixture at the road contact point. The rear seal shall act as a final strike-off and shall be adjustable. The spreader box and rear seal shall be so designed and operated to provide a uniform mix consistency behind the box. The spreader box shall have suitable means provided to side shift the box to compensate for variations in the pavement width. A burlap drag or other approved screed may be attached to the rear of the spreader box to provide a highly textured uniform surface. A drag stiffened by hardened slurry is ineffective and should be replaced immediately.

2. CALIBRATION

A. General

1. Each mixing unit to be used in the performance of the work shall be calibrated prior to the start of the project. Previous calibration documentation covering the exact materials to be used may be acceptable, provided that no more than 60 days have lapsed. The documentation shall include an individual calibration of each material at various settings that can be related to the machine metering devices. Any component replacement affecting material proportioning requires that the machine be recalibrated. No machine will be allowed to work on the project until the calibration has been completed and/or accepted.

3. WEATHER LIMITATIONS

A. General

1. Slurry Seal shall not be applied if either the pavement or air temperature is below 50°F (10°C) and falling, but may be applied when both pavement and air temperatures are above 45°F (7°C) and rising. No slurry seal shall be applied when there is the possibility of freezing temperatures at the project location within 24 hours after application. The slurry seal shall not be applied when weather conditions prolong opening to traffic beyond a reasonable time.

4. SURFACE PREPARATION

A. General

1. Immediately prior to applying the slurry seal, the surface shall be cleared of all loose material, silt spots, vegetation, and other objectionable material. Any standard cleaning method will be acceptable. If water is used, cracks shall be allowed to dry thoroughly before applying slurry seal. Manholes, valve boxes, drop inlets and other service entrances shall be protected from the slurry seal by a suitable method.

5. APPLICATION

A. General

1. When local conditions warrant, the surface shall be wetted with water ahead of the spreader box. The rate of application of the water spray may be adjusted as the temperature, surface texture, humidity, and dryness of the pavement change. Pooling or standing water shall be avoided.

The slurry seal shall be of the appropriate consistency upon leaving the mixer. A sufficient amount of material shall be carried in all parts of the spreader box at all times so that complete coverage is obtained. Overloading of the spreader box shall be avoided. No lumps or unmixed aggregate shall be permitted. No dry aggregate either spilled from the lay-down machine or existing on the road, will be permitted.

No streaks, such as those caused by oversized aggregate or broken mix, shall be left in the finished surface. If excessive streaking develops, the job will be stopped until the cause of the problem has been corrected. Some situations may require screening the aggregate prior to loading it into the units going from the stockpile area to the jobsite.

B. Rate of Application

1. The slurry seal mixture shall be of the proper consistency at all times so as to provide the application rate required by the surface condition. The application rate shall be in accordance with the table below.

AGGREGATE TYPE	SUGGESTED APPLICATION RATE
Type II	10 - 18 lb/yd ²

C. Joints

1. No excess buildup, uncovered areas, or unsightly appearance shall be permitted on longitudinal or transverse joints. The contractor shall provide suitable width spreading equipment to produce a minimum number of longitudinal joints throughout the project. When possible, longitudinal joints shall be placed in a wheel path. Partial width passes will only be used when necessary and shall not be the last pass of any paved area. A maximum of 6.0 inches shall be allowed for overlap of longitudinal joints.

D. Mixture

1. The slurry seal shall possess sufficient stability so that premature breaking of the material in the spreader box does not occur. The mixture shall be homogeneous during and following mixing and spreading. It shall be free of excess liquids which create segregation of the aggregate. Spraying of additional water into the spreader box will not be permitted.

E. Handwork

1. Areas which cannot be accessed by the mixing machine shall be surfaced using hand squeegees to provide complete and uniform coverage. If necessary, the area to be hand worked shall be lightly dampened prior to mix placement. AS much as possible, handwork shall exhibit the same finish as that applied by the spreader box. All handwork shall be completed prior to final surfacing.

F. Lines

1. Care shall be taken to apply straight lines along curbs, and shoulders and intersections. Roofing or heavy plastic may be used to begin or end a pull cleanly. This also provides for easy removal of excess slurry.
2. Any overspray on concrete sidewalks or the retaining wall shall be removed to the satisfaction of the Engineer.

G. Rolling

1. Parking areas shall be rolled by a self-propelled, 10-ton (maximum) pneumatic tire roller equipped with a water spray system. All tires should be inflated per manufacturer's specifications. Rolling shall not start until the slurry seal has cured sufficiently to avoid damage by the roller. Areas which require rolling shall receive a minimum of two (2) full coverage passes.

H. Clean up

1. All utility access areas, gutters and intersections, shall have the slurry seal removed. The Contractor shall remove any debris associated with the performance of the work on a daily basis.

END OF SECTION 02513

SECTION 05/520

HANDRAILS AND RAILINGS

PART I GENERAL

1. GENERAL

- A. Work necessary to furnish and install handrails and railings.

2. SUBMITTALS

- A. Product Data: Furnish the following:

- 1. Calculations: Use required code design loads hereinbefore specified under Article DESIGN LOADS, and include but do not limit calculations to the following:
 - a. Bending stress in, and deflection of posts showing system meets requirements of ASTM E985-85.
 - b. Stress in post base connection.
 - c. Calculation of anchorage forces and comparison of these forces to the 2003 IBC (International Building Code) recommendations regarding safe allowable design loads of anchorages. In the case of concrete expansion (wedge) anchors, manufacturer's catalog data and/or recommendations for use in 4,000 psi concrete are acceptable with the conditions that (1) allowable anchor loads are determined using a safety factor of 4 on ultimate pullout and shear (2) 12-anchor diameters spacing and 6-anchor diameters edge distance is required for full use of the allowable pullout and shear value. For spacings less than 12 diameters and edge distances less than 6 diameters, a reduction must be taken in allowable pullout and shear values.

- B. Catalogue data and design information on handrail or components used.

- C. Shop Drawings: Furnish for the following:

- 1. Railings including splices, attachments and dowel lengths. Show all railings in related and dimensional position with scale plans and elevations and coordinate these with local codes and project requirements prior to fabrication.
- 2. Test data as follows may supplement load calculations provided it covers the complete handrail systems including anchorage:
 - a. Test data for handrail or components showing load and deflection due to load, in enough detail to prove handrail system is strong enough and does satisfy national, stat and local standards, regulation and code requirements, including OSHA, using design loading as specified under article DESIGN LOADS.

- b. Deflection Criteria: As specified in ASTM E985-85 with design loads as specified.
 - c. Include, but do not limit data to, the following connections:
 - 1) Handrail/post connections not specifically detailed.
 - 2) Handrail post/base connections, including concrete anchors.
 - d. Data shall also include, but not be limited to, the following subassemblies:
 - 1) Handrail post assembly complete with rails and each of the base connections.
3. Certification: Furnish manufacturer's certificate stating handrail system as installed meets requirements of the Specifications.

3. QUALITY ASSURANCE

- A. Handrails, railings and associated fittings, hardware and specialties shall meet minimum requirements of national, state, and local standards, regulations, and code requirements, including OSHA and the current edition of the hereinbefore specified building code(s), as the specifically apply to this project.

PART 2 PRODUCTS

1. GENERAL

- A. Like Items of Materials: End products of one manufacturer in order to achieve standardization for appearance, maintenance and replacement.
- B. Acceptance or Rejection of Handrail System: Based upon appearances, strength, and submittal calculations and tests.
- C. Handrail System Material: As shown and as specified.
- D. Posts shall be furnished longer than needed and field cut to exact dimensions required in order to satisfy vertical variations on the actual structure. Or, handrail may be furnished with and approved base that provided +/- 1/4-inch vertical adjustment inside the base fitting. If the adjustment needed in the field exceeds +/- 1/4-inch, the post may be shortened but must not be raised beyond the bottom of the lowest set screw in the base fitting.

2. STEEL HANDRAILS

- A. Pipe: carbon steel, ASTM A53, Type E or S, Grade B, or ASTM A501, 1-1/2-inch NPS with 1.900-inch outside diameter and a minimum 0.145-inch wall thickness for rails and a minimum of 0.200-inch wall thickness for posts.
- B. Fittings:
 - 1. Anchor Bolts and fasteners: Galvanized steel.
 - 2. Handrail Post Bolted Baseplate Connector:

- a. Fabricate from carbon steel meeting minimum requirements for piping as specified and as shown.
 - b. Insert: Fabricate from pipe with minimum wall thickness of 0.20 inch or from solid rod.
 - C. Concrete Embedded Metal Anchorages: Provide as specified in Section FABRICATED METALWORK AND CASTINGS.
 - D. Finishes:
 - 1. Epoxy anchors: Provide heavy-duty stainless steel A304, 1/2-inch diameter, for exterior use only. Design and provide the number required.
 - E. Paint handrail to meet SSPC – Paint 15 – Steel Joist Shop Paint. Match color of existing railing.
3. FABRICATION OF STEEL HANDRAIL SYSTEM
- A. Handrail Post to be Bolted to Metal or Concrete
 - 1. Furnish longer than needed and field cut to exact dimensions required to satisfy any vertical variations on actual structure.
 - 2. Detail Drawings require field fit-up. Do not use shims or grout under baseplate.
 - B. Cut pipe square within 2 degrees and to lengths within 1/8-inch (3mm).
 - C. Remove burrs from cut edges.
 - D. Form elbow bends and wall returns to uniform radius, free from buckles and twists, with finished surfaces smooth.
 - E. Close exposed ends of steel pipe by welding 3/16-inch (4.8mm) thick steel plate in place or use prefabricated fittings.
 - F. Welding:
 - 1. Miter and cope intersections of posts and rails within 2 degrees, fit to within 0.02-inches (0.5 mm), and weld all around.
 - 2. Thoroughly fuse without undercutting or overlap.
 - 3. Remove splatter, grind exposed welds to blend, and contour surfaces to match those adjacent.
 - G. Provide explosion prevention holes at closed ends of pipes.
 - H. Form and assemble joints which will be exposed to the weather so as to exclude water.

- I. Treatment of Field Welds: Touch up welds by application of two coats high zinc dust content paint to dry film thickness of 2 mils.
- J. Repair of Defective Work: Remove stained or otherwise defective work and replace with material that means Specification requirements.
- K. Repair of Defective Work: Remove stained or otherwise defective work and replace with material that means

PART 3 EXECUTION

1. HANDRAIL INSTALLATION

- A. Assembly/Installation: Perform in accordance with manufacturer's written recommendations for installation and as shown.
- B. Protection from Entrapped Water:
 - 1. Make provisions in exterior and interior installations subject to high humidity to drain water from railing system.
 - 2. When posts are mounted in concrete or when bends or elbows occur at low points, drill weep holes of 1/4-inch diameter at lowest possible elevations, one hole per post or rail. Drill hole in the plane of the rail.
- C. Post and Rails:
 - 1. Set post plumb and aligned to within 1/8 inch (3mm) in 12 feet (3.66 m).
 - 2. Install posts and rails in same plane. Remove projections or irregularities that present a hazard or prevent users from sliding their hands continuously along top rail.

END OF SECTION 05/520